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CERTAINTY OF VOCATIONAL-EDUCATIONAL PLANS AND FIRST YEAR COLLEGE ACHIEVEMENT.

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THE PURPOSE OF THIS STUDY WAS TO TEST THE RELATIONSHIP BETWEEN A MEASURE OF DEFINITENESS OF VOCATIONAL-EDUCATIONAL GOALS AND THE ACADEMIC SUCCESS OF UNIVERSITY FRESHMEN. THE SAMPLE SELECTED CONSISTED OF EVERY TENTH STUDENT, 360 TOTAL, WHO ENROLLED IN THE FALL OF 1966 AT THE UNIVERSITY OF WASHINGTON. LESSER SAMPLES WERE RANDOMLY SELECTED FROM THIS GROUP FOR STATISTICAL ANALYSIS. VARIABLES CONSIDERED WERE BIRTH ORDER, SOCIOECONOMIC STATUS, PREDICTED GRADE POINT AVERAGE, AND DEFINITENESS OF VOCATIONAL-EDUCATIONAL GOALS BASED ON HOLLINGSHEAD'S FIVE-LEVEL SYSTEM WHICH TAKES INTO ACCOUNT BOTH THE FATHER'S OCCUPATION AND EDUCATIONAL LEVEL. FINDINGS INDICATED NO STATISTICALLY SIGNIFICANT RELATIONSHIPS BETWEEN DEFINITENESS OF VOCATIONAL-EDUCATIONAL GOALS AND SEX, BIRTH ORDER, SOCIOECONOMIC STATUS, PREDICTIVE GRADE POINT AVERAGE, OR THE NUMBER OF AREAS OF COURSE WORK TAKEN. IT WAS CONCLUDED THAT DEFINITENESS OF VOCATIONAL-EDUCATIONAL GOALS DOES NOT ACCOUNT FOR ANYTHING THAT IS NOT ALREADY ACCOUNTED FOR BY HIGH SCHOOL GRADES IN THE PREDICTION OF ACADEMIC SUCCESS. (EM)

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Bureau of Testing

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Certainty of Vocational-Educational Plans and First Year College Achievement,[1]

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The relationship between a measure of definiteness of vocational-educational (DVE) goals and the academic success of university freshmen is explored. Several previous studies had shown a relationship, especially for male students. However, the relationship between these variables when prior academic achievement, academic aptitude, socio-economic status and birth order are taken into account had not been previously studied. In this research, data were obtained for a sample of 360 University of Washington freshmen, and treated in a factorial analysis of variance design. No statistically significant relationships were found involving DVE.

The freshman year of college is a crucial one in a person's academic career. Some students drop out because they find the work or social adjustment too difficult. What factors affect a student's academic performance in the freshman year? Obviously, aptitude of the student is important but there probably is a complex interaction of other factors in addition which makes the difference. Lavin (1965) indicates that factors such as socio-economic status, sex and birth order affect academic performance. Another variable which may be important is the degree of definiteness of vocational-educational goal. Some freshmen entering college have already decided on a vocation;

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some have not decided on a vocation but have decided on a major; some have not made a decision on either. Could it be that a student who is definite about his future vocation is the more highly motivated, earns higher grades than a student of the same aptitude, but less definite about his future? If this were true, and definiteness of future plans did have an effect on achievement, then information about such plans could be useful in the prediction of a student's academic success.

This study investigated the relationship between definiteness of vocational-educational goals and academic achievement among freshmen students at the University of Washington. The investigation was conducted so as to control the effects of other variables known to relate to academic performance. In particular, the study took into account the well known predictors of collegiate success: high school performance, tested academic achievement and aptitude, socio-economic status and birth order.

Background

Several studies have been conducted relating the definiteness of vocational-educational goals (DVE) to academic achievement. Methodologies have differed somewhat as have the populations from which student samples were drawn. Some researchers failed to control for the varying scholastic aptitude of their students. They simply analyzed the relationship between DVE and the cumulative grade point average (GPA). The relationships found in these studies have been confounded by the effect of aptitude on cumulative GPA and any relationship between aptitude and DVE.

Marshall and Simpson (1943) interviewed male college students throughout their four undergraduate years to find out if they had made a choice of vocation (definitely, tentatively, or not at all). These students were

given aptitude tests and their grades for each semester over the four years were recorded and averaged. The authors presented the means for each of the three groups for each semester on grade point averages and aptitude test scores. No significance tests were performed on these means. In this study, aptitude and GPA data were combined into a single analysis. They made these conclusions after inspecting the means: 1) The group with definite vocational choices ranked mediocre in academic aptitude, but their academic performance was mediocre to high. 2) The group with tentative vocational choices ranked high in both academic aptitude and grades. 3) The group who were undecided ranked mediocre to low in academic aptitude but their academic performance was consistently low. The data from this study were too incomplete to really support any theory about the relationship between DVE and academic performance.

Ashby, Wall and Osipow (1966) collected data on a group of male and female college students and divided this group into three groups: 1) those who were decided on their vocational-educational plans, 2) those who were tentative about their plans, and 3) those who were undecided. They found that the "decided" group, in comparison with the other two groups, scored higher on aptitude measures, had higher high school grades and earned better first term GPA's in college. This is interesting information; however, since the groups were not equalized according to aptitude, one could not make conclusions about the effect of definite vocational-educational goals on academic achievement.

Emily Sherwood (1957) conducted a study investigating the "Relationship between the Academic Achievement and Goal Orientations of Students." Her subjects were male and female college freshmen. In part of her study, she did not control for aptitude. She related goal-orientation to academic

achievement and found a significant relationship between academic achievement and the indication that the student had chosen a major, without taking aptitude of the students into account. However, in another part of her study, she did control for aptitude. She administered a forced choice inventory concerning goal-orientation to these students. Then she added information from this inventory to aptitude test scores included as predictors in a multiple regression formula used to predict academic achievement. She found that the addition of such data resulted in a significant increase in predictive ability for liberal arts students, but not for students in business college or education.

In studies where academic aptitude has been controlled, there have been indications that the relationship between DVE and academic achievement may be differential according to sex. An early study by Zorbaugh and Kuder (1937) investigated the cumulative GPA of college women at all four year levels in relation to DVE. To control for aptitude, the women were divided into ten blocks according to level of aptitude based on scores of the Ohio State University Psychological Examinations. Within each block, the mean GPA was computed for the group of students who had chosen a vocation and for the group who had not made this decision. There were no differences between means of the two groups within each block.

McQuary (1954) administered a questionnaire to under and overachieving freshmen male students. Under and overachievers were defined on the basis of aptitude test scores (ACE Psychological Examination total scores) and first semester grade point averages. He found that these two groups of students could be differentiated according to several items on the questionnaire, including certainty of vocational goal. The overachievers were more

apt to have been certain about their vocational choice. There seems to have been a socio-economic difference between the two groups. Overachievers were from "less fortunate" backgrounds than were underachievers; a smaller percentage of their fathers were in professional or semi-professional occupations; a smaller percentage of their mothers were in professional or semi-professional occupations before marriage; both parents had less formal education than the parents of underachievers.

Consistent with the two previously mentioned studies, Weitz, Clark and Jones (1955) found a differential effect according to sex. During orientation week at Duke University, where the study was conducted, all freshmen were required to take a placement test battery including tests of scholastic aptitude, reading achievement, mechanics of English expression and mathematics, At the time these tests were administered, the students prepared test record cards on which they recorded, among other things, their proposed major field of study and their proposed vocational objectives. They were instructed to write "not sure" if they had not decided on either of these choices. The researchers then divided the population into the following three groups: Group A-Students who recorded "not sure" for both major field and vocational objective. Group B-Students who expressed a fairly clearly identifiable preference for a major field of study in one or more of the following ways: 1) They listed a major field of study. 2) They listed a vocational objective for which undergraduate or pre-professional training was available at Duke (as, for example, law, medicine, dentistry, social work, teaching). 3) They listed a major field or vocational objective in which Duke offered closely related training (as, for example, journalism choices, which were assigned to English). Group C-Students whose major field of study was inappropriate

at Duke because training was not available (as, for example, architecture) or who recorded "not sure" for their major field, and who listed two or more vocational objectives for which there was no common training at Duke (as, for example, law and medicine). Group C was eventually omitted from the study because it was a "'mixed' motivational group." Then they matched a sample of 100 students who expressed a preference for major field of study with 100 who had expressed no such preference, according to their performance on the Placement Test of Scholastic Aptitude. They found college men who had made a decision on major field of study (Group B) earned higher grades than those who had no preference (Group A). There was no difference for the two groups of women.

Later Weitz (1959) carried out another study involving only freshman women as subjects with the same results. There was no difference in GPA between women of Groups A and B. Instead of a matched groups design, an analysis of covariance was adopted to control for aptitude in this second study.

A study by Bloomberg (1955) involved a sample of 370 first semester freshmen, both men and women. A questionnaire was administered to the sample and item analyzed against a criterion of grade point average with aptitude partialled out. Thirty-one items of the questionnaire were found to correlate (at the .05 level of significance) with the achievement criterion and were analyzed to characterize the typical achieving college student. One characteristic cited was that he was seriously interested in a definite vocational goal. Watley (1965) found significant results in the opposite direction. However, the student population studied was considerably restricted

compared with previously mentioned studies. In this instance the students were freshman males in an engineering curriculum. Prior to the beginning of classes, each student had been asked to indicate on a questionnaire how confident he was that he would remain in his chosen field of study. There were four possible choices: Very confident, Quite confident, Somewhat confident and Not at all confident. Students composing the Quite and Somewhat confident groups were combined to make a single group. The least confident group earned higher grade averages than either of the other two groups. Academic aptitude for the two groups reportedly did not differ; an analysis of variance of aptitude test scores (Institute of Technology Mathematics Test and Minnesota Scholastic Aptitude Test) indicated no significant differences between means.

Definiteness was also negatively related to academic performance in a second restricted population. Although Holland and Nichols (1964) did not relate DVE to achieved GPA, they did study a measure of indecision as it related to academic aptitude. Their subjects were National Merit scholars, a highly select group. Their Indecision Scale was developed through an item analysis of 273 activities, hobbies, school subjects and sports of these students. (Holland and Nichols, 1964, pp. 27-28):

> All of the students who "decided" on a vocation were compared with all the students who were "undecided" at the time they filled out the questionnaire, the end of senior year in high school. Students were asked to reply to the following item: "My present career choice is: (if possible name an occupation)." Students who said "undecided, don't know, or ?" formed the criterion group of "undecided" students. Students giving no response or unclassifiable responses were excluded from both the "decided" and "undecided" criterion groups. ... The item analyses for each sex provided more than 30 items per sex with more than a 10 per cent difference between "decided" and "undecided" students.

The fifteen most discriminating items made up this scale. For males, scores on the Indecision Scale correlated .17 (significant at .01 level), .08

(non significant), and 1.4 (significant at .05 level) with SAT Verbal scores, SAT Math score and high school rank, respectively. For females, SAT Verbal scores correlated -.22 (significant at .01 level). The other two correlations were close to zero. These correlations, although low, are significant, which means that there is a tendency for scores of male students on the Indecision Scale to vary with aptitude test scores. In other words, high scorers on the Scale tended to score high on the aptitude tests.

Research rationale

In the earlier studies described, academic aptitude or expected academic performance was controlled in several ways: analysis of covariance, matched groups design, division of subjects into blocks, multiple regression analysis. Traditionally, this has involved a single test or test battery as a measure of expected performance. The current research adopted a design whereby several well-studied determinants of collegiate success could be controlled and DVE evaluated in terms of the extent to which it relates to variability in academic performance not accounted for by these better known predictors. This control was achieved in two ways. Firstly, the dependent variable was taken to be the difference between the achieved GPA and a predicted GPA provided by the student's participation as a high school senior in the Washington Pre-College (WPC) Testing Program. This WPC predicted GPA was based upon weighting a number of predictors including high school GPA's in separate academic areas, and tests of verbal and quantitative achievement and aptitude.

Secondly, unlike the previous studies, the variables of socio-economic status and birth order were controlled and the relationships between DVE and these variables explored. It was postulated that the effect of DVE on academic

performance might be differential with respect to either socio-economic status or birth order. Both of these are known to be themselves related to academic achievement.

Socio-economic status and birth order were balanced as effects through a factorial analysis of variance design. In this design the groups differing as to DVE were equalized according to socio-economic status and birth order. Each DVE group was composed equally of students of Low, Middle and High socio-economic levels. Each DVE group similarly had the same proportion of students who were first or only borns, and who were later borns.

The null hypothesis tested in this study was that of a lack of relationship between definiteness of vocational-educational goals and college achievement when the effects of academic aptitude, prior academic achievement, birth order, sex and socio-economic status are taken into account.

Methodology

Sources of subjects and data. Subjects were drawn from the population of nearly 3,000 students who entered the University of Washington in the fall of 1966, following graduation in June 1966 from Washington State high schools. Data on birth order, socio-economic status, and definiteness of vocational-educational goals were derived from student applications for admission to the University. Predicted grade point averages and achieved grade point averages for the fall and winter quarters for each student were made available by the University's Bureau of Testing. Records of course work completed by each subject during the first two quarters were provided by the University Registrar.

The data for every tenth student were transferred to a separate data sheet (See Appendix 1) and coded for each of several variables according to

the following scheme: Birth order--first and only borns (0), later borns (1); Socio-economic status--high (0), middle (1), low (2); Definiteness of vocational-educational goals (DVE)--high (0), moderate (1), low (2), blank (no indication) (3), Predicted GPA--high (2), middle (1), low (0).

The rating for socio-economic status was based on Hollingshead's (1958) five level system which takes into account both father's occupation and educational level. Hollingshead's levels 1 and 2 were combined in the high group, and levels 4 and 5 were combined in the low group.

Assignment to a category of definiteness of vocational-educational goals was based on the student's answers to three questions on the admissions applications relating to vocational plans, choice of an academic major and academic interests in the absence of a choice of major. High DVE was equated with having a vocational choice, with or without a chosen major. Moderate DVE corresponded to having no vocational choice, but a chosen major or two or more academic interests quite similar to each other. Low DVE was defined as having no vocational choice, no major, and interests, if given, that were dissimilar.

Predicted grade point average was divided into three levels containing roughly the same proportion of entering freshmen. For men, the low level included predicted GPA's of 1.7 to 2.3, the middle level included 2.4 to 2.6, and the high level included 2.7 to 3.3. For women, the low level included predicted GPA's of 1.9 to 2.4, the middle level included 2.5 to 2.7, and the high level included 2.8 to 3.4.

Analyses. All statistical analyses were done separately for men and women. It was apparent from the earlier research that a differential effect of DVE on academic achievement for the two sexes might be anticipated.

Additionally, the grade prediction formula at the University of Washington was different for the two sexes.

Every tenth application from the alphabetized set was selected, coded and assigned to one of 48 experimental groups according to sex status (2 levels), birth order (2 levels), socio-economic status (3 levels), and DVE (4 levels). Applications were to be selected and coded until the smallest number assigned to any one of the twenty-four groups for either sex was 10. However, the number of applications which were coded for the "blank" level was so small that these were included with the "low" DVE level reducing the number of experimental groups from 48 to 36. Random selection of 531 male and female records was required before each of the 36 groups had at least 10 members.

Chi square analyses of frequencies were made between DVE and sex, and for each sex, between DVE and socio-economic status, birth order, and predicted GPA. These analyses permitted a study of the relationships between DVE and these other variables.

Ten subjects were chosen at random from each of the 36 experimental groups for the factorial analyses of variance. Before the analyses of variance were carried out, a final comparison based on the selected sample was made. For each sex DVE was compared with the number of course areas in which work was completed during the first two academic quarters. These analyses were to test the possibility that students of varying DVE might also vary in their tendency to enroll in courses in different areas. This was important as the difficulty of work undertaken might be influenced in turn by a tendency to take a greater or lesser variety of courses. For the purpose of these analyses, undergraduate course work at the University was divided

into 10 areas of instruction: Business and management; Education; Engineering; Humanities; Social sciences; Biological sciences; Physical sciences; Health sciences; Applied sciences (forestry, veterinary medicine, and agriculture); and Other professions (including home economics, physical education, communications, architecture, military science and geography). A tally was made of the number of different areas in which each student took courses for the fall and winter quarters.

The final and principal analyses were the factorial analyses of variance with categorization based upon birth order (2 levels), socio-economic status (3 levels) and DVE (3 levels). The dependent variable was the difference between the achieved cumulative GPA over two quarters and the WPC predicted all-university GPA. A constant value of 4.0 was added to this difference to insure that all values would be positive. The theoretical range for the resulting dependent variable values was 0.0-8.0.

Results

There were 531 males and 437 females randomly selected for the first chi square analyses comparing DVE with socio-economic status, birth order, predicted GPA level and sex. As noted earlier, the number of subjects selected was determined by the requirement that each cross-classification category contain at least 10 observations. Table 1 indicates the distribution of the observations over the cross-classifications. All analyses except those involving sex status as a classification were done separately for the two sexes. None of these analyses, as Table 2 indicates, were statistically significant, or even close to significance.

A rigorous test of the relationship between DVE and number of areas in which course work was taken was not possible as nearly all observations were

in a few categories. No student did work in fewer than two or in more than six areas. Table 3 establishes that nearly all students take work in either 3 or 4 areas. There is no evidence to indicate that DVE level makes a difference in the number of different areas in which course work is taken. A student who is not definite does not take courses in more (or fewer) areas than a student who is definite.

Table 1

Distribution of Originally Selected Sample
and Means of Dependent Variable for
the Analyses of Variance

Classification variables				Male Sample		Female Sample	
Group	Birth Order	SES	DVE	n	$\bar{x}$	n	$\bar{x}$
1	First	High	High	10	3.67	10	4.02
2	First	High	Mod.	10	3.84	10	3.77
3	First	High	Low	10	4.19	10	4.08
4	First	Mid	High	10	4.00	10	3.96
5	First	Mid	Mod.	10	3.73	10	3.90
6	First	Mid	Low	10	3.64	10	3.95
7	First	Low	High	10	4.08	10	3.36
8	First	Low	Mod.	10	3.71	10	3.38
9	First	Low	Low	10	3.86	10	3.80
10	Later	High	High	10	4.08	10	3.99
11	Later	High	Mod.	10	4.04	10	3.93
12	Later	High	Low	10	3.83	10	3.84
13	Later	Mid	High	10	4.19	10	3.82
14	Later	Mid	Mod.	10	4.05	10	3.64
15	Later	Mid	Low	10	3.58	10	3.86
16	Later	Low	High	10	3.90	10	3.76
17	Later	Low	Mod.	10	3.62	10	3.96
18	Later	Low	Low	10	3.83	10	3.54

Table 2

Comparison of DVE with Other Academic Predictors

Sample	Variables	d.f.	Obtained x^2 value	Critical x^2 value (p=.05)
Male	DVExSES	4	5.359	9.488
Female	DVExSES	4	1.359	9.488
Male	DVExBO	2	.986	5.991
Female	DVExBO	2	.055	5.991
Male	DVExPredicted GPA	4	3.287	9.488
Female	DVExPredicted GPA	4	5.651	9.488
All	DVEx Sex	2	.277	5.991

Table 3

DVE Level and Number of Course Areas

in which Course Work was done

Male Subjects

No. of Course Areas	DVE Level High	Mid	Low
2	5	7	2
3	26	22	34
4	23	27	21
5	6	4	3

Female Subjects

No. of Course Areas	DVE Level High	Mid	Low
2	2	1	0
3	26	35	33
4	26	22	19
5	6	1	7
6	0	1	1

The factorial analyses of variance were also statistically non-significant for both men and women. This was ture for all main effects of all the independent variables, as well as the interactions. Table 4 summarizes these results.

Discussion

The chi square analyses indicate a lack of relationship between DVE on the one hand and sex, birth order, socio-economic level, predicted grade point average and number of areas of freshman course work on the other, for both male and female college freshmen. No prior hypothesis was available for these selections except the study of Holland and Nichols (1964) did indicate the presence of a relationship between high scores on the Indecision Scale and aptitude level. However, the Holland and Nichols sample was made up of National Merit Scholars, students of superior academic ability. Their findings might be true only for students in the top aptitude levels. It must be kept in mind that the Indecision Scale is different in content from the measure of DVE in this study. The Indecision Scale contains information on a student's

Table 4

Summary Table for Factorial Analyses of Variance

Males

Variables	d.f.	Mean Square	F ratio	Critical F value (.05 level)
Birth order	1	.090	.138	1014.00
Socio-economic status	2	.187	.285	39.49
DVE	2	.514	.783	39.49
Birth order x SES	2	.251	.382	39.49
Birth order x DVE	2	.752	1.145	39.49
SES x DVE	4	.647	.985	8.31
Birth order x SES x DVE	4	.624	.950	8.31
Within variance (error)	162	.657		

Females

Variables	d.f.	Mean Square	F ratio	Critical F value (.05 level)
Birth order	1	.0078	.030	1014.00
Socio-economic status	2	1.4914	5.837	39.49
DVE	2	.1040	.407	39.49
Birth order x SES	2	.6380	2.497	39.49
Birth order x DVE	2	.5220	2.043	39.49
SES x DVE	4	.1066	.417	8.31
Birth order x SES x DVE	4	.4540	1.770	8.31
Within variance (error)	162	.2555		

participation in activities, hobbies, school subjects and sports.

The results of the two factorial analyses would seem at first to contradict the findings of earlier research and to be somewhat puzzling. In this study, no relationship between DVE and adjusted academic achievement could be detected for either sex.

The setup of this study was planned in an attempt to find out if DVE would add to the prediction of GPA, the standard predictors being high school grades, academic achievement and aptitude test scores. Earlier studies did not use high school grades as data in analyses. It appears that what academic achievement variance has been accounted for in earlier studies by means of DVE can more easily be accounted for with high school grades. DVE does not appear to add anything when this is included.

It is interesting that birth order and socio-economic status were both found in addition to be unrelated to the difference between predicted and achieved GPA. These variables have usually been found to be related to GPA. Their effects (like DVE) appear to be mediated or reflected in the effect of high school grade point average when that is added to aptitude in making predictions.

Summary

This research was designed to investigate the contribution that a measure of definiteness of vocational-educational goals (DVE) might make to the prediction of academic success of entering university freshmen. This was accomplished by investigating the relationship between DVE and achieved grade point average for University of Washington freshman students, taking into account the variables of sex, birth order, socio-economic level, previous academic achievement and academic aptitude. The first three variables were

handled by performing separate 2x3x3 factorial analyses of variance for each sex. Academic aptitude and prior academic achievement were controlled by subtracting a predicted grade point average (computed on the basis of aptitude and achievement test scores and high school grades) from the cumulative two quarter grade point average. This difference score was the dependent variable in the analysis of variance.

No statistically significant relationships were found between DVE and the dependent variable. This is in contrast with some earlier studies reporting for males a positive relationship between DVE and academic achievement where that achievement had been adjusted for tested academic aptitude. Therefore it appears that DVE does not account for anything that isn't already accounted for by high school grades in the prediction of academic success.

No statistically significant relationships were found between DVE and sex, birth order, SES, PGPA and number of areas of course work taken.

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APPENDIX

Data Sheet--Vocational-Educational Certainty and Achievement April 1967

1) Name_____
Last First Middle

2) High School at Graduation_____

3) Sex (Male-0, Female-1) (1)_____

4) Birth Order (First-0, Later-1) (2)_____

5) Socio-economic Status:
Education_____
Occupation_____ (3)_____

6) Vocational-Educational Choice:
a) Vocation_____ (4)_____
b) Major_____ (5)_____
c) Interests_____ (6)_____
d) Definiteness (DVE- 0,1,2,3) (7)_____

7) Experimental Group (8-9)_____

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8) WPC Number (10-16)_____

9) Predicted All-University GPA (17-18)_____

10) PGPA Group (0,1,2) (19)_____

11) Case selected for Analysis of Variance (No-0, Yes-1) (20)_____

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12) Academic work in each area: (No-0, Yes-1)
a) Area 0- Business and administration (21)_____
b) Area 1- Education (22)_____
c) Area 2- Engineering (23)_____
d) Area 3- Humanities (24)_____
e) Area 4- Biological Sciences (25)_____
f) Area 5- Social Sciences (26)_____
g) Area 6- Physical Sciences (27)_____
h) Area 7- Health Professions (28)_____
i) Area 8- Agriculture, forestry, veterinary medicine (29)_____
j) Area 9- Others: architecture, home economics, communications, physical education, military science (30)_____

13) Major_____ (31)_____

14) Cumulative GPA (32-34)_____

15) Enrollment (Didn't complete either quarter-0, Completed 1 quarter-1, Completed 2 quarters-2). (35)_____

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16) Dependent variable
Cumulative GPA minus Predicted GPA _____
+ 4.00
= _____ (36-38)_____

17) Dependent variable^2 (____)^2 = _____ (39-44)_____